



Rapid Cities - Responsive Architectures: A conference examining design, planning & construction in the modern world

Responsive Megastructures: Growing Future Cities for Global Challenges

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Abstract:

From the mid-twentieth century the primary drivers for cities were industrialization and globalization, as urban development sought to maximize productivity and access to labour and resources along with connectivity to markets. More recently, these drivers have been augmented and, in some contexts, replaced by those that emphasize people and their environment over profit. As the manifold anthropogenic impacts of cities present increasingly urgent and major global challenges, it is clear we need a new vision for collective life.

This paper therefore examines the development of fast-paced future cities throughout history and, in particular, the dominant technological thrust that characterizes them. As we move further into the twenty-first century, the emergence of new socially engaged visions for future cities that are coupled with environmental concerns suggest a positive shift away from those futures driven primarily technological expectation. We then explore these alternatives by identifying those visions which suggest social futures and global futures. Despite their initial promise, our research has detected an ongoing convergence of visions for future cities rather than radical alternatives. In an era of rapid transformation and global uncertainties it is evident we need to forge new pathways for the design and delivery of habitats for collective life.

We conclude our paper by presenting a prototype of a responsive megastructure. Conceived as a 'living material eco-system', this responsive megastructure anticipates and is receptive to fluctuating demands by sharing resources (e.g. material, energy, spatial, financial). We explain how matter can be programmed through 'tuneable environments' so various shapes, patterns and structures can be grown. In doing so, we present a new vision for megastructures, where matter can be aggregated and scaled to grow future cities, that can embody the complexities of urban life in heterogeneous contexts around the world and respond to their situation and future challenges.

Author(s) Biography (200 words each):

Nick Dunn is Professor of Urban Design and Executive Director of Imagination, the design research lab at Lancaster University, UK. He is Senior Fellow at the Institute for Social Futures, examining the insights that the arts, humanities and social sciences can bring to the ways we think, envision, and analyze the futures of people, places and planet. His work responds to the contemporary city and is explored through experimentation and writing on the nature of urban space. He has produced two commissioned reports for the UK's Government Office for Science and contributed to the latest Ministry of Defence Global Strategic Trends report as lead author on *Future of Communities and Values out to 2050* (2018). Nick is also the author of numerous books on architecture and urbanism including: *Digital Fabrication in Architecture* (2012), *Dark Matters: A Manifesto for the Nocturnal City* (2016), co-author of *Future Cities: A Visual Guide* (2020), and co-editor of *Designing Future Cities for Wellbeing* (2020). His expertise on cities, design, and futures have led to curated exhibitions and keynotes around the world.

Adam Blaney has recently completed his doctoral studies and is Lecturer in Responsive Architecture at Imagination, the design research lab at Lancaster University, UK. His practice-led research to date has focused on the development of self-assembling materials integrated with digital designs to grow adaptive structures. Adam's current research rethinks, explores and prototypes novel design and fabrication processes so shape, patterns, and objects can adapt their properties on the fly through 'tuneable environments'. Tuneable environments aim to redefine how design and fabrication processes interact and maintain interrelationships with material units at granular resolutions. In doing so, Adam's interdisciplinary experimental research begins to highlight the possibilities of architecture and urban environments acting as 'living material eco-systems' where resources can be shared to meet fluctuating demands through passive means. This approach is being explored for how it might address significant climatic demands facing the 21st century. Adam has published papers across a range of research areas in journals and at various international conferences.